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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

and

BUREAU OF PLANT INDUSTRY

Report of the

ALLEGHENY FOREST EXPERIMENT STATION*

CALENDAR YEAR 1938

AND PROPOSED PROGRAM 1939

*Maintained at Philadelphia, Pa., in cooperation with the University of Pennsylvania.

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ROCKY MT. FOREST & RANGE
EXPERIMENT STATION

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1938

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* Members are appointed by the Secretary, United States Department of Agriculture.

ALLEGHENY FOREST EXPERIMENT STATION

1938

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ANNUAL REPORT FOR 1938,

PROGRAM FOR 1939, AND STATION NEEDS

The Forest Problem of the Allegheny Territory

In the States of Delaware, Maryland, New Jersey, and Pennsylvania there are today 18,000,000 acres of forest land, and 4,000,000 acres of abandoned farm land likely to revert to forest. In the same States are 16,000,000 people, and in the adjacent city of New York and the District of Columbia, additional millions.

The essential forest problem, which research must help to solve, is how to put the forests of the Allegheny region in optimum condition to serve these enormous populations. Reasonable objectives of this service are:

(1) A continuous supply of all the low-grade forest products needed in the region, and a substantial part of the high-grade products.

(2) Adequate outdoor recreation not simply for the few who can travel long distances to obtain it, but for the entire self-supporting population.

(3) Prevention of erosion, and - in conjunction with engineering works - control of floods and yearlong regulation of streams used for domestic water supply, manufactures, navigation, generation of power, recreation, and other purposes.

(4) Stable employment at satisfactory wages of not less than 250,000 forest workers, with corresponding employment in secondary industries based on forest products.

Present Unsatisfactory Forest Conditions

In spite of early and well-sustained efforts by State authorities, forest conditions in general range from fairly satisfactory to deplorable. The 5-1/2 million acres of farm woodland, 3-1/4 million acres of National and State forests and State game preserves, are in the best condition. At the other end of the scale, in terms of wood volume, are about 3 million acres of scrub oak, aspen, and fire cherry. Southern New Jersey and the anthracite coal field of Pennsylvania remain the worst sufferers from forest fires in the entire northeastern United States.

The tiny remnants of virgin timber - now less than one acre out of a thousand - serve only to remind the region of the magnificent resource it once possessed.

As producers of wood these forests supply only a tithe of the lumber which the region consumes, almost no softwood pulpwood, and little high-grade raw material for such industries as veneer. They become less and less dependable sources of crossties, mine timbers, and piling, all of which are in enormous demand.

As recreation grounds the forests of the Middle Atlantic States are far more adequate to the needs of great populations, but in important respects are pitiable failures. Although over 1,000,000 licensed sportsmen hunt and fish in them and many times that number of picnickers, campers, hikers, and nature lovers visit them yearly, the bulk of the population of such cities as New York, Philadelphia, Baltimore, and Washington derive little or no recreation from them. Only small portions of the oak-pine forest of south Jersey, which lies within 75 miles of 12,000,000 people, are used intensively for recreation. An important factor in the situation is the depleted, unattractive condition of the forest.

As watershed protection the forests may be described, in the almost complete absence of reliable information as to what constitutes effective cover, as varying from adequate to very poor. This judgment is based solely on the density of forest cover, and completely disregards such highly important factors as stand composition. Yet in this populous territory streams are of enormous importance, at all stages from high to low water. In the long run it is doubtful whether periodic flood losses - even including those of 1936, estimated at $250,000,000 in the four States - are more serious than the recurrent, unnoted losses from inadequate summer flow of such streams as the Delaware, Susquehanna, Potomac, and upper Ohio Rivers.

As sources of employment these forests have steadily declined, adding to economic difficulties resulting from the gradual exhaustion of such mineral resources as petroleum, the falling off of anthracite coal production, and the ebb of agriculture on all but the best farm land. Tax delinquency, widespread in some predominantly forested regions, has added to the financial problems of many rural counties of dwindling population.

Forest Betterment the Station's Objective

The object of the United States Forest Service in establishing the Allegheny Station was the discovery of biological and economic facts necessary to betterment of forest conditions in the four States. Although improvement of the one National Forest in the territory is logically given a high place in the Station's program, this Forest

includes less than 2-1/2 percent of the total forested area. The major research problems are those of the public lands in other ownerships, the farm woodlands, and the very important industrial holdings in stable ownership.

The Allegheny Station has made notable progress in recent years toward the establishment throughout its territory of branch stations, in experimental forests, from which to serve all classes of forest owners and managers. In addition to experimental forests on the Allegheny National Forest and on the Lebanon State Forest in New Jersey, the Station has acquired by transfer from other Federal agencies suitable tracts for branch station establishment in Huntingdon County, Pa., Prince Georges County, Md., and Wicomico County, Md., immediately adjacent to southern Delaware. At all of these branches we have completed or have under construction simple living quarters and field laboratories.

The Station's Accomplishment, Plans, and Needs

Betterment of forest conditions is to be achieved by (1) preventing further devastation or deterioration of the mature forest, (2) improving immature forest stands, and (3) restoring to forest land already denuded. Although this betterment is hampered by general economic conditions, and is at best a gradual process requiring decades, it is also badly handicapped by lack of biological and economic information which research alone can provide. For example, the unparalleled opportunity to improve forest conditions offered in recent years by the AAA, the CCC, and other relief organizations, and the 1938 Flood Control program, has been partly lost because no one, the foresters included, has had more than elementary knowledge of how to weed, thin, and prune the forest, what and how to plant, how to safeguard the forest against fire, disease, insects, and other enemies, and what constitutes good watershed cover. The Allegheny Station's recent contribution to better knowledge in these and other fields is summarized, its plans for the next calendar year are described, and its more pressing needs outlined, in the following paragraphs.

(1) Prevention of forest devastation and deterioration

Harvest Cuttings

About 350,000 acres of mature or near-mature forest are cut over annually in the four States, to yield what may be considered the normal harvest of forest products. A few thousand acres of this are cut in National and State Forests, where sawtimber and similar high-grade products are the object of management. With rare exceptions the ensuing forest on private land is inferior to that cut.

Accomplishments. Studies by the Station in the northern hardwoods-hemlock type of the Allegheny National Forest pretty well demonstrate that clear cutting of young second growth in which reproduction is not already established results in a very inferior third growth, so far as future sawtimber is concerned. They indicate that partial cutting requires careful selection of the stand reserved for sawlog production. In the oak-pine type of southern New Jersey they suggest that seed-bed conditions may be improved artificially for pine reproduction, and that seedling reproduction of oak is practically impossible under present conditions, including large populations of seed-destroying animals or birds.

Plans for the current year include a considerable expansion of the studies of harvesting methods, including regeneration, on the Allegheny National Forest, and the formulation, from a large volume of data obtained chiefly in virgin stands, of silvical principles to be applied in management for sawtimber. Studies under way in south Jersey of the possibilities of controlled burning as an aid to regeneration of pine, and of other measures affecting pine reproduction, will be continued on a reduced scale.

Needs. In northern hardwood-hemlock forests harvested as pulpwood or chemical wood, which includes most of the 4,000,000 acres in private ownership, the Station should undertake studies of cutting methods. It has nothing but general silvical information to offer to the considerable number of commercial operators interested in perpetuating their stands. Because information is urgently needed, and is not available elsewhere, some research has been undertaken by the operators themselves. In the oak-pine type the New Jersey Forest Service has appealed to the Station for adequate help in regeneration experiments. This help should be given. Elsewhere in the oak-pine type, and in the entire oak type, where some 250,000 acres, nearly all in private ownership, are cut over annually, harvesting methods that do not depend wholly on regeneration from sprouts have never been devised. Because repeated sprouting produces progressively poorer stands, deterioration of the forest continues nearly everywhere. A special problem, which must be solved if an industry with an annual product valued at $750,000 in Delaware and Maryland is to survive, is the proper method of harvesting Christmas holly. Work on these problems should be in the Station's program.

Forest Fire Protection

Annual expenditures by the States and Federal government for State-wide fire protection have averaged about $600,000, and have reduced forest fires to an insurable risk in the greater part of the Station territory. But in southern New Jersey, and in the coal fields of Pennsylvania and Maryland, fire remains a major source of forest devastation.

Accomplishments. In close cooperation with the New Jersey Forest Fire Service, Region 7 of the U. S. Forest Service, and the CCC, the Station studied the fire problem of south Jersey from past records and a limited amount of field work. Fuel types were set up, and fire incidence and rates of spread determined for some. Availability of water for fighting a great majority of recent fires was established, and methods devised for mapping and classifying roads and water supplies for fire protection. In safety strip construction, "controlled burning" was found to cause much less damage in oak-pine than in pure pine stands, and in stands previously treated than in those untreated. With financial aid from the State of New Jersey, the Station began a detailed field study of fire weather and fire danger meters, and a comprehensive office analysis of the State's recent performance in fire control.

Plans. The Station will continue studies described in the previous sentence; also studies of controlled burning and rate of spread. One or more phases of the work will be completed.

Needs. Until the percentage of burn in the coal fields, as in southern New Jersey, can be reduced to approximately 1/5 of the recent figure, little real progress can be made toward developing their great potential forest assets. Because the administration of fire protection is very largely a State function, and nearly all records are in State hands, the research necessary to adequate fire control must be initiated by the States. Maryland has signified its desire for Station cooperation in fire research, and the Station should be in a position to give it.

Mensuration of Trees and Stands

Ignorance or doubt as to the growth rate of their forests is an important factor in the "cut-out and get-out" policy of most owners of industrial forests, and of the indifference to woodland management of many farmers. Detailed information on how fast trees and forests grow, in cords, board feet, or other commercial units, is a potent influence against destructuve forest practices.

Accomplishment. The Station some years ago completed a comprehensive study of growth rates for even-aged stands dominated by oaks of various species, with some discussion of variations caused by density of the stand, or number of trees per acre. There have been similar studies of oak, and of pitch, Virginia, and loblolly pine by State agencies. The Station has amplified the loblolly pine data by information on the range of diameters to be encountered in even-aged stands - information of particular value where piece products of specified minimum dimensions, such as piling or veneer bolts, command a premium. It is now investigating for Region 7 of the Forest Service growth rates of individual loblolly pines and associated hardwoods in stands of average density as the basis for a proposed forest sustained yield unit on the Eastern Shore of Maryland.

Plans. We will complete the Eastern Shore study.

Needs. There is need for information on growth rates in the most productive forest types, which best lend themselves to continued private ownership. Several Pennsylvania manufacturers of pulp and chemicals derived from northern hardwoods own large acreages of forest land, which they protect against fire, and on which some of them practice a creditable silviculture. A Station study of yields to be expected from the northern hardwoods on at least the better sites would be a stimulating Federal contribution to private business, and would also be of great value to the Allegheny National Forest of nearly half a million acres. A similar study in plantations of the more important species would particularly benefit the farmers who over a long period of years have planted 85,000 acres in the four States. The Station should at least cooperate with Pennsylvania State College and the other agricultural colleges in it.

(2) Improvement of existing stands

For Wood Production

Only a tiny fraction of the Allegheny forests are producing as much wood as do comparable sites under intensive management in the Old World. Yet the possibilities of such management in the more productive forest types, adjacent to good markets are illustrated by a State thinning of southern white cedar in a New Jersey swamp. Forty-two man months of labor were employed at a net profit, and with benefit to the stand, in thinning 12 acres.

Accomplishments. Station studies of timber stand improvement in 40-year northern hardwoods-hemlock, indicate that a thinning which leaves only those trees having promise as sawtimber removes a volume of wood sufficient to justify a commercial pulpwood or chemical wood operation. A thinning as heavy as this, however, we have found to increase the damage at higher elevations by glaze storms; glaze damage is greatest to black cherry, and least to hemlock, among the species of this type. Studies recently begun in younger stands have demonstrated the extremely poor form of the sprout black cherry typical of third growth, and the difficulty of improving sprout stands of northern hardwoods.

Demonstrations of timber stand improvement practices, made by the Station on CCC funds and with CCC assistance, indicate that the first thinning in white pine plantations should be made at about 15 years, and in dense natural stands of Virginia pine on old fields somewhat earlier. In pruning dead limbs of white pine a pole axe, used as a mace, was found to be the most effective tool up to height of about 7 feet; above that height the most efficient and safest method is to climb to the uppermost limbs to be removed, and to prune with a hand saw on the way down.

Station pathologists have defined the conditions under which rot follows the thinning of sprout clumps of certain species, and the pruning of others.

Plans. The Station will undertake a comprehensive study of timber stand improvement practices in Virginia pine, a pulpwood species of wide distribution in the four States. This study has been strongly urged by the Maryland Forest Service, which has done some work on it, and will cooperate actively with us at our new branch stations in Maryland.

Needs. The proposed sustained yield unit based on loblolly pine in Wicomico County, Maryland, emphasizes the urgent need for the Station to undertake an exhaustive study of timber stand improvement practices with this species - among the most valuable in the Station territory. Past studies, somewhat fundamental in character, give us an excellent foundation on which to build, and the new experimental forest on the Eastern Shore a favorable place to begin work.

For Watershed Protection

In the Flood Control Act of 1936 Congress recognized for the first time the place of watershed management in flood control. In this and later amendments it directed the Department of Agriculture to examine the watershed of nearly every considerable stream in the four States, and to recommend such measures of "waterflow retardation" as appear justified by flood losses. The most promising measure in areas of natural vegetation is such management of that vegetation as will promote infiltration of rain and melting snow into the great reservoir of the soil, thereby lessening surface run-off, erosion, and flood heights.

Accomplishment. Completion of preliminary reports on four watersheds, and progress on one detailed survey of an important watershed, have clearly shown that there are enormous variations in the density and composition of the forest cover. No less clear is the showing that information is completely lacking on either the relative or the absolute influence of the different types or conditions of forest on infiltration. It cannot be said with confidence that scrub oak, valueless for its wood, is any less efficient in erosion and flood control than virgin hemlock and hardwoods, highly valuable for a variety of forest products. Certainly there is no mathematical expression of their relative efficiency. Some progress has been made in designing simple instruments for measuring infiltration rates, and for sampling the silt load of streams.

Plans. Preliminary examinations will be completed for the Passaic, Pequest, and Schuylkill River watersheds. Detailed surveys of the Youghiogheny River and Crooked Creek watersheds will be completed, and work programs for watershed treatment will be outlined if found to be justified. The instruments above described will be improved and used to measure conditions as far as possible.

Needs. Expenditures of millions of dollars of public funds for reforestation, intensive management of watershed forests, public acquisition of critical areas, or any other measures for flood control on watersheds, must be strictly limited by the benefits they confer. The Station should undertake at once studies to measure forest influences, both qualitative and quantitative. Data on such important factors as infiltration, interception of rain and snow by tree crowns, evaporation from forest soils, transpiration from forest vegetation, and erosion, obtained in other regions with totally different climate, soils, topography, and vegetation, cannot be applied to this region, but must be gained through local research. They are needed if watershed management is adequately to safeguard and supplement engineering works in solving the flood and general streamflow problems of the Delaware, the Susquehanna, the upper Ohio, the Potomac, and other important streams of this territory. Such powerful organizations as the Interstate Commission on the Delaware River Basin and the Tri-State Authority of Pittsburgh actively seek the information to be obtained from this research.

For Recreation

The best forest for wood production and watershed protection may or may not be the best for recreation. For example, sportsmen in Pennsylvania have recently contended that some forested State game lands should be burned periodically to produce sprouts desirable as deer browse. Again, plantations in geometrical pattern may not be as attractive aesthetically as those spaced less regularly, or with species segregated by blocks or groups.

Stand betterment for game production is a subject for investigation by zoologists as well as botanists or foresters, and the Station is pleased to see cooperative studies in game management recently undertaken by Pennsylvania State College, the Pennsylvania Game Commission, and the U. S. Bureau of Biological Survey, at the College. Facilities at our new branch in Huntingdon County, Pennsylvania, and opportunities for research in the Tionesta virgin forest in northwestern Pennsylvania, will be freely offered to these agencies by the Station.

(3) Restoration to forest of denuded areas.

Artificial Regeneration

Denuded forest areas in the Allegheny territory include the 3 million acres dominated by scrub oak, aspen, and fire cherry, which followed severe cutting and repeated fires in the coal fields, northwestern Pennsylvania, and southern New Jersey; a like acreage of abandoned farm lands; and a small but highly important area of culm and

rock banks and other waste lands created by mining, which are known to contribute heavily to the siltation of such navigable streams as the Schuylkill, and are conspicuous eyesores in some areas of great potential value for recreation. Some of the abandoned farm land and small areas of the degenerate forest types will reforest naturally within a reasonable time, but planting or other artificial regeneration is necessary if the very great bulk of these denuded lands are to return to satisfactory forest. About 225,000 acres have actually been planted in the four States during the present century. Surveys by the Pennsylvania Department of Forests and Waters of representative public and private plantings, chiefly on abandoned farm land, and by the Station of Allegheny National Forest plantations in aspen-fire cherry lands, both reveal heavy mortality, averaging 65 percent.

Accomplishment. Tests of species, size of planting stock, and of a promising improvement in planting method, were begun in the Allegheny National Forest. They supplement the earlier survey, and an important trial of red pine planting stock grown from seed collected over the wide range of this species, which is now planted more extensively than any other in the Station territory. Station pathologists continue to solve local forest nursery problems created by damping-off fungi and root rots, and to investigate the relationship of soil fungi to tree seedlings, having in mind practical applications to artifical forestation.

Plans. A planting guide for CCC use on the Allegheny Plateau will be prepared from data currently and previously obtained. Cooperation will be continued with the Susquehanna Collieries Company and the University of Pennsylvania in some exploratory work on forestation of culm and rock banks in the anthracite coal region.

Needs. The Station should undertake, in close cooperation with the Soil Conservation Service, and with the State forest services and agricultural colleges, a regional survey of existing plantations, to determine species adaptation to the wide variety of sites in the region, best methods of planting, and the principal enemies of plantations, such as disease. The Soil Conservation Service and Pennsylvania State College in particular have advanced this survey as urgent. The forestation problems peculiar to the coal regions should also be studied by the Station, because of the certainty that effective flood control, maintenance of navigable channels, and protection of expensive reservoirs against silting, depend in important part on preventing erosion of culm banks in the watersheds of the Delaware, Schuylkill, and Susquehanna Rivers.

Economic and Social Problems

Economic facts are as necessary in bringing about forest betterment in the broadest sense as biological facts. "Without people forests are meaningless."* Forest conditions are satisfactory only if they satisfy human economic and social needs.

*Report of the Chief of the Forest Service, 1938.

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EXPERIMENT STATION

The foregoing description of the Station's accomplishments, plans, and needs has dealt very largely with the biology of forest betterment. Actually, economics are kept constantly in mind. Although costs of silvicultural operations conducted on a strictly experimental scale are indicative only, they are recorded wherever possible. In planning experiments measures are not tested which promise to be prohibitively expensive, even with liberal allowance for future increase in value of forest products or services.

There are two strictly economic or social studies which should improve forest conditions where they are now worst in the Allegheny Station territory. Such betterment is costly. The following studies will show whether the cost is greater or less than the benefit which the enormous population of this and the adjoining territory will receive.

A study of the opportunities for forest employment in the coal fields, particularly the anthracite coal field. Such employment will include really effective fire protection, and protection of the forest against insects, disease, animals, and other enemies; planting of denuded areas, including culm and rock banks; timber stand improvement; harvesting and re-manufacture of forest products; game and wildlife management, including hunting and fishing; development and administration of general forest recreation, such as camping, hiking, picnicking, and winter sports; intensive management of watershed cover. The study should include also methods of financing such employment, and the possibility of eventual self-liquidation of the project; problems of land ownership and taxation; and direct or indirect benefits to populations outside the coal fields. This study has promise of revealing a major solution to what is perhaps the most acute unemployment situation in the United States.

A study of methods of expressing in dollars-and-cents the so-called intangibles of forest value - the services rendered by the forest as recreation grounds and watershed protection. This will furnish a basis on which to calculate justifiable public and private expenditures for protecting and managing forest lands not alone for their tangible products - wood in its many forms - but also for recreational use, erosion prevention, and streamflow regulation. Some of the most thoroughly denuded areas in the four States have, because of their proximity to huge cities, the greatest potentialities for recreation and water supply. The cost of their rehabilitation is generally considered prohibitive because their standing timber is, except for restricted areas, negligible. Southern New Jersey is a conspicuous example. It should be possible to devise sound methods of evaluating the intangibles, as for example a comparison of assessed values of the general run of forest land with those of restricted areas developed for recreation, or in municipal watersheds.

A third economic study is needed for the particular benefit of the considerable number of private landowners who are desirous of practicing forestry on their lands, but cannot do so at a profit. They include the majority of farmers, and a few coal companies, pulp companies, and

chemical wood operators. This is a study of existing and possible markets for wood, particularly of the poorer quality and smaller sizes, of which vast quantities rot in the woods each year. Current market information for forest products has been distributed from time to time by the State forestry departments and extension services, and cooperation with these agencies is essential. The Forest Survey should be extended into the Allegheny territory, because markets are very dependent on probable supply. The study should be integrated with the work of the Eastern Regional Research Laboratory, now being established at Philadelphia to discover new uses for surplus farm commodities. About one-quarter of all farm land is in forest in the four States, and wood ranks high among the surplus commodities.

All three of these economic and social studies should be undertaken at the Allegheny Station. The Station has never had any of the funds appropriated for economics work, although its aid in market studies and in appraising recreational and similar values of forest land has been sought.

RS-AL
Mr-1

PROJECT STATUS SHEET

February 4, 1939

SILVICS, BEECH-BIRCH-MAPLE-HEMLOCK

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Silvics and ecology, beech-birch-maple-hemlock type

PURPOSE:

To determine the silvical characters of species, and the ecology of stands, as the basis for silvicultural practices.

REVIEW OF PAST WORK:

Strip cruises and intensive plot studies in virgin stands have provided data on composition, age relationships, and ecological succession of the type and sub-types. Other studies, chiefly in Kane Forest, include relation of soil, climate, animals (principally man, deer, and rabbits), and pathogens to species and stands. A substantial body of silvical information on the principal species has resulted, some of which is in print.

ACCOMPLISHMENTS DURING PAST YEAR:

A Departmental circular or bulletin by Forbes and Hough on the silvics and ecology of this type was about half completed.

PLANS FOR NEXT YEAR:

Completion of the Departmental publication. Current observations in sample plots, etc.

DATE OF COMPLETION:

Continuing, except for publication above noted.

ASSIGNMENT:

Forbes, Hough, Ostrom, resident superintendent at Kane.

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PROJECT STATUS SHEET

February 4, 1939

HARVEST CUTTINGS, BEECH-BIRCH-MAPLE-HEMLOCK

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Harvest cuttings, beech-birch-maple-hemlock type

PURPOSE:

To determine methods of harvesting mature stands of beech-birch-maple-hemlock which will insure satisfactory regeneration. Development of the reserved stand and establishment of natural reproduction are included. Sawtimber management alone considered to date.

REVIEW OF PAST WORK:

Ten-year data from partial cuttings in a typical timber sale on the Allegheny National Forest indicated that advance reproduction grows slowly, seedling sprouts and stump sprouts rapidly, following cutting. Very recently small-scale observations have begun of the effects of clear cutting in second-growth and culled virgin stands, combined with different treatments of the advance reproduction, and of subsequent sprouts.

ACCOMPLISHMENTS DURING PAST YEAR:

Further analysis of the 10-year data above described shows that partial cutting must be done with full consideration of individual tree condition if satisfactory growth of the residual stand is to result. Additional evidence published that clear cutting of young second growth results in inferior third growth.

PLANS FOR NEXT YEAR:

After final analysis and publication of the 10-year data above described, a beginning will be made on a comprehensive series of sample plots in current timber sales on the Allegheny National Forest, illustrating selective and perhaps other types of cutting in sawtimber management. Cooperation will be offered the Wood Chemical Institute, local chemical wood manufacturers, and the Allegheny Forest, if the Madison Laboratory undertakes a study of methods and costs of logging in the chemical wood industry.

DATE OF COMPLETION:

Continuing project. Results of stump sprout treatment available in 1 or 2 years.

ASSIGNMENT:

Forbes, Hough, Ostrom, resident superintendent of Kane Forest.

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PROJECT STATUS SHEET

February 4, 1939

SOURCE-OF-SEED PLANTATIONS, RED PINE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting, red pine

PURPOSE:

To determine, in cooperation with the Lake States Experiment Station, the adaptability to the conditions of the northern Allegheny Plateau of red pine from nine seed source regions (Lake States to New England).

REVIEW OF PAST WORK:

4-1/2-acre planting site prepared by CCC in 1933-36. In 1937 50 lots of 100 transplants each, raised by the Lake States Station, were planted. At end of second growing season growth was better than average for the more southerly Lake States strains, and poorer than average for the northern Minnesota and northeastern United States strains.

PLANS FOR NEXT YEAR:

Re-examine plantation at least at end of growing season. Short note on early indications.

DATE OF COMPLETION:

Not less than 40 years.

ASSIGNMENT:

Hough, Hetzel.

RS-AL
Mt-1

PROJECT STATUS SHEET

February 4, 1939

STAND IMPROVEMENT, BEECH-BIRCH-MAPLE-HEMLOCK

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Stand improvement, beech-birch-maple-hemlock

PURPOSE:

To determine the best methods of weeding, thinning, pruning, or otherwise improving the growth in volume or quality of immature stands. Work confined to date to stands managed for sawtimber.

REVIEW OF PAST WORK:

Cleaning or thinning of several representative second-growth stands in Kane Forest showed that stand improvement holds little promise for stands inadequately stocked with crop trees, such as often follow clear cutting of young second growth, and indicated that TSI in 40-year stands is likely to yield a commercial cut of pulpwood or chemical wood. Results published. Small-scale test pruning of hardwoods begun.

ACCOMPLISHMENTS DURING PAST YEAR:

Re-examination of thinning plots following glaze storm of 1936 showed that thinning increases susceptibility of stands to glaze damage.

PLANS FOR NEXT YEAR:

Analysis of 5-year remeasurement of thinned plots at Kane, and publication of significant findings.

DATE OF COMPLETION:

Continuing.

ASSIGNMENT:

Forbes, Hough, Ostrom, resident superintendent of Kane Forest.

RS-AL
Fp-1

PROJECT STATUS SHEET

February 4, 1939

SPECIAL CCC STUDY, FOREST PLANTING NORTHERN HARDWOOD TYPE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting, beech-birch-maple-hemlock

PURPOSE:

To provide information needed in establishment of successful forest plantations, particularly in the aspen-pin cherry sub-type.

REVIEW OF PAST WORK:

A cooperative study with R-7. Plantations 3 to 10 years of age in Allegheny National Forest and adjacent private land, indicated spruce, red pine, and Scotch pine suitable to progressively drier sites. Red oak considered successful; white ash; larch, and white pine failures. Frost heaving a severe local problem.

ACCOMPLISHMENTS DURING PAST YEAR:

In continued cooperation with Allegheny Forest, new plantations to test size of stock, species adapted to severe sites, and methods of planting.

PLANS FOR NEXT YEAR:

Preparation of a planting manual for CCC use, brief study of methods of handling, shipping, and holding planting stock in cold storage.

DATE OF COMPLETION:

If necessitated by lack of funds after July 1, 1939, follow-up to be done by cooperating agencies.

ASSIGNMENT:

J. E. Hetzel, CCC.

RS-AL
Fs-1

PROJECT STATUS SHEET

February 4, 1939

SEED STORAGE AND TREATMENT, BLACK CHERRY

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Seed studies, black cherry

PURPOSE:

To determine the effect of different storage conditions and seed treatments on germination of black cherry.

REVIEW OF PAST WORK:

Stratification was found to be necessary for good germination; the effect of other treatments was not marked. An experiment was begun with heating and pulping treatments of ripe and unripe seed.

ACCOMPLISHMENTS DURING PAST YEAR:

None.

PLANS FOR NEXT YEAR:

Technical note on tests already under way.

DATE OF COMPLETION:

1940.

ASSIGNMENT:

A. F. Hough.

RS-AL
Pf-3

PROJECT STATUS SHEET

February 4, 1939

EFFECTS OF FIRE, OAK-PINE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest fire protection

LINE PROJECT: Effects of fire, oak-pine

PURPOSE:

To determine the effects of fire on the tree, the forest, and the site in order to supply the basic information necessary for the formulation of sound silvicultural and fire protection policies and plans. Studies include damage to standing trees and the site, also any beneficial effects of controlled fires on seedbed and species composition.

REVIEW OF PAST WORK:

A study of damage to individual trees was made in southern New Jersey following severe spring fires in 1930, and a fire resistance scale was set up for the six important tree species; Technical Note No. 13. In 1936 a "controlled burning" experiment was begun in cooperation with the New Jersey Forest Service, on the Lebanon State Forest. Indications to date that the safety-strip method of preparing firebreaks markedly reduces the damage to standing trees over broadcast burning with no pre-treatment. Damage is much less in the oak-pine type than in the pitch pine type. These results have been summarized in manuscript form.

ACCOMPLISHMENTS DURING PAST YEAR:

None.

PLANS FOR NEXT YEAR:

1. The controlled burning study will be continued according to the plan.
2. Manuscript on tree damage from controlled burning will be put in final shape for publication.

DATE OF COMPLETION:

1952.

ASSIGNMENT:

Schnur and Little

RS-AL
Pf-3

PROJECT STATUS SHEET

February 4, 1939

BEHAVIOR OF FIRE, OAK-PINE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest fire protection

LINE PROJECT: Behavior of fire, oak-pine

PURPOSE:

To obtain information relative to forest fire behavior necessary for the formulation of sound policies and plans for fire protection in the oak-pine type. Includes studies of rate of spread, fuel type classification, resistance to control, and fire weather relations.

REVIEW OF PAST WORK:

Work on this project has been sporadic in nature because it has been financed almost entirely from emergency funds in cooperation with Region 7 of the Forest Service and the New Jersey Forest Fire Service. Maps, charts, and preliminary analytical studies of State forest fire records were completed in 1936 for Region 7.

ACCOMPLISHMENTS DURING PAST YEAR:

1. Data from 70 fires indicate rate of spread to be two to three times faster in the pine than in the oak types.
2. Twenty-five preliminary fuel type classes were set up in cooperation with the New Jersey Forest Service. Classification of 186 fires indicates an approximate even distribution between the (1) pitch pine, (2) oak-pine, and (3) grass, types.
3. The effects of several weather factors on fire inception and occurrence were determined from 1935-37 fire records and a detailed report was prepared.

PLANS FOR NEXT YEAR:

1. Continue fire weather study, analyze State records, prepare report.
2. Test R-7 fire danger meter for applicability in southern New Jersey.
3. Continue rate-of-spread study during spring fire season.

DATE OF COMPLETION:

Indefinite; above phases, 1940.

ASSIGNMENT:

Schnur and Little.

RS-AL
Pf-3

PROJECT STATUS SHEET

February 4, 1939

CONTROL OF FIRE, OAK-PINE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest fire protection

LINE PROJECT: Control of fire, oak-pine

PURPOSE:

To obtain information essential to the sound planning of forest fire control in the oak-pine type. Includes elapsed time, cost, transportation, and water supply studies.

REVIEW OF PAST WORK:

Emergency and temporary cooperative funds only available for this work; work in New Jersey only. Preliminary time cost analyses of State records for one year made in 1936.

ACCOMPLISHMENTS DURING PAST YEAR:

1. Detailed time and cost analyses of 1935-37 New Jersey records made and report prepared. Record too short for substantial conclusions, but established trends.
2. Transportation and water supply studies on 186 fires show that tank trucks could have been used advantageously on 86 per cent.
3. Methods for mapping and classifying roads and water supplies for fire protection purposes were determined and a report prepared for CCC use.

PLANS FOR NEXT YEAR:

Complete analyses of the New Jersey 1931-38 forest fire records, and prepare manuscript for publication.

DATE OF COMPLETION:

Indefinite; above study, December, 1939.

ASSIGNMENT:

Schnur and Little.

RS-AL
Mr-3

PROJECT STATUS SHEET

February 4, 1939

NATURAL REGENERATION, OAK-PINE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Silvics, oak-pine

PURPOSE:

To determine the silvical characters of the principal species and the environmental factors which affect their natural regeneration by seed or sprout in order to supply the basic information for the formulation of sound silvicultural policies and plans.

REVIEW OF PAST WORK:

Seed production of oak and pine, effect of site on reproduction, development of oak sprouts, study of root systems of oak and pine, seed bed conditions, and seed fall, have been studied and reported in 11 technical notes and papers in various journals.

ACCOMPLISHMENTS DURING PAST YEAR:

1. The seedlings necessary for the conversion of coppice oak stands to a high forest in southern New Jersey are very scarce or are entirely lacking. Enough viable seed is produced over a period of years but animals alone may almost entirely eliminate seedling reproduction. Insects, diseases and unfavorable conditions for both germination and seedling growth take their toll also. Gradual restoration of natural habitat will improve many of these conditions. Ecology Vol. 19, No. 2. April 1938.
2. Seed dispersal of southern white cedar (Chamaecyparis thyoides L.) in New Jersey was found to be mainly between the months of October and February though some seed fell as late as August. Technical Note No. 21. Nov. 1938.

PLANS FOR NEXT YEAR:

Review of following going studies: (1) phenological observations, and (2) seed bed treatment study to determine their future value and advisability of continuance.

DATE OF COMPLETION:

Present plans, phenological observations 1942, pine conversion 1950.

ASSIGNMENT:

Schnur and Little.

RS-AL
M-3

PROJECT STATUS SHEET

February 4, 1939

STAND IMPROVEMENT, OAK-PINE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Stand improvement, oak-pine

PURPOSE:

To determine and demonstrate the effects of various stand treatment measures, on the volume, growth, and quality of forest stands, in order to supply basic information for the formulation of sound silvicultural practices in the oak-pine type. Includes such treatments as weeding, thinning, pruning, and other measures designed to improve stands at any time prior to harvest cuttings.

REVIEW OF PAST WORK:

A thinning study in a 13-year old stand of mixed oak on the Lebanon Experimental Forest, N. J., was started in 1935.

ACCOMPLISHMENTS DURING PAST YEAR:

1. Resprouting vigor of hardwoods, even after a light cutting in a stand as much as 13 years old, may prove ineffective for encouraging immediate seedling reproduction. The openings created are partially refilled by sprouts almost at once. Interplanted trees would be adversely affected also, by the vigorous sprout growth. Jour. of For. Vol. 36, No. 12. Dec. 1938.
2. A Virginia pine demonstration thinning was made on the Cedarville State Forest in southern Maryland, in cooperation with the Maryland State Department of Forestry and the CCC. Tentative conclusions are that the first thinning in dense, stagnant stands should be made before 15 years, probably at about 10 years, reducing the stand to 1300-1500 trees per acre, followed at 15-20 years by a second cut to 900 trees, and at about 25 years to 700 trees.

PLANS FOR NEXT YEAR:

1. Review pine conversion study on Lebanon Forest to determine its future value and advisability of continuance, and obtain necessary measurements of pine understory if feasible.
2. Tally losses due to opening of stand on Virginia pine plots, summarize results, and complete report.
3. Begin comprehensive stand improvement study in Virginia pine on Research Center Experimental Forest.

DATE OF COMPLETION:

Mixed oak thinning study 1960-1970.
Virginia pine study, December, 1939. If facilities become available, remeasurement every 5 or 10 years until crop rotation age, 40-50 years, or about 1968 for youngest stands, will furnish valuable additional information.

ASSIGNMENT:

Schnur.

RS-AL
ME-3

PROJECT STATUS SHEET

February 4, 1939

GROWTH AND DEVELOPMENT OF LOBLOLLY PINE STANDS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Mensuration

LINE PROJECT: Stand studies, oak-pine

PURPOSE:

To determine rates of growth for loblolly pine, and obtain information on the factors governing the growth and development of stands, so as to supply the basic information necessary for sound forest management.

REVIEW OF PAST WORK:

Begun by Forest Service on private land in 1906 and later maintained in cooperation with the Maryland State Department of Forestry. Results of past studies published in one Maryland State Bulletin and two Jour. of Agri. Research articles.

ACCOMPLISHMENTS DURING PAST YEAR:

Region 7 began a sustained yield project in Maryland and asked the Station to cooperate in determining the growth. Some CCC funds were made available by the Region. The Station has started the growth study.

PLANS FOR NEXT YEAR:

Complete growth study on sustained yield unit.

DATE OF COMPLETION:

Indefinite; sustained yield study, 1939.

ASSIGNMENT:

Schnur.

RS-AL
Fp-3

PROJECT STATUS SHEET

February 4, 1939

INTERPLANTING, OAK-PINE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting, oak-pine

PURPOSE:

To determine the silvicultural and economic possibilities of supplementing the present inadequate stocking of Coastal Plain stands in southern New Jersey by interplanting both coniferous and deciduous species in sprout hardwood and pine stands of varying age and density.

REVIEW OF PAST WORK:

State of New Jersey has made extensive coniferous interplantings on State Forests. From 1930-33 the Station interplanted more than 10,000 coniferous seedlings under oak coppice. Two release cuttings have been made on some areas, at 3-year intervals. Early results have been described in two published articles. Oak and maple interplantings made in 1937.

ACCOMPLISHMENTS DURING PAST YEAR:

None.

PLANS FOR NEXT YEAR:

Coniferous interplantings to be remeasured, data summarized, and report to be written for publication.

DATE OF COMPLETION:

1945.

ASSIGNMENT:

Schnur and Little.

RS-AL
ME-2

PROJECT STATUS SHEET

February 4, 1939

OAK YIELD STUDY

FIELD DIVISION: Forest Management Research

WORK PROJECT: Mensuration

LINE PROJECT: Stand studies, oaks

PURPOSE:

To provide regional volume, stand, and yield tables, and closely related information, necessary for the management of the upland oak forests in the Eastern United States.

REVIEW OF PAST WORK:

Results of this study are available in U.S.D.A. Tech. Bul. #560.

ACCOMPLISHMENTS DURING PAST YEAR:

None.

PLANS FOR NEXT YEAR:

Prepare paper on comparison of tree volumes.

DATE OF COMPLETION:

1939.

ASSIGNMENT:

Schnur.

RS-AL PROJECT STATUS SHEET
Mt-Special, White Pine February 4, 1939

SPECIAL CCC STUDY
THINNING AND PRUNING OF PLANTED WHITE PINE IN MARYLAND

FIELD DIVISION: Forest Management Research.

WORK PROJECT: Silviculture

LINE PROJECT: Stand improvement, white pine

PURPOSE:

To demonstrate (1) the effect of various pruning and thinning treatments on the volume and quality of wood production and on aesthetic values in planted white pine, and (2) the relative efficiency and economy of various tools and methods for pruning dead limbs of white pine.

REVIEW OF PAST WORK:

A cooperative project with the Maryland State Department and the CCC. Nine acres of thinning and pruning demonstration plots were established on the Loch Raven watershed of Baltimore, Maryland in 1937, representing four treatments. Indications are that 12x12 spacing at 25 years is about right for plantation white pine on a good site where the trees are 40-45 feet high. To obtain good spacing, however, thinning should be made at an earlier age, probably at about 15 years. For pruning dead limbs up to 7 feet above the ground a mace such as the blunt end of a pole axe was most satisfactory; above 7 feet a standard hand pruning saw was the best tool. The "Tarzan method" of climbing up and pruning on the way down was found to be the most efficient and most secure for the worker. Volume tables for plantation white pine and tulip poplar were constructed. Technical Notes Nos. 16 and 17.

ACCOMPLISHMENTS DURING PAST YEAR:

Pruning tool study results published in Jour. of For. 36#6. 1938. Thinning study data summarized.

PLANS FOR NEXT YEAR:

Complete thinning study establishment report. Tally losses due to opening of stand and summarize.

DATE OF COMPLETION:

December 1939. If facilities become available, remeasurements every 5 or 10 years until crop rotation age, 60 years, or about 1972, will furnish valuable additional information.

ASSIGNMENT:

Schnur.

RI-AL
Surveys
FCS

PROJECT STATUS SHEET

February 4, 1939

PRELIMINARY EXAMINATIONS, FLOOD CONTROL

FIELD DIVISION: Flood Control Surveys

WORK PROJECT: Flood control surveys

LINE PROJECT: Preliminary examinations, flood control

PURPOSE:

In cooperation with the Soil Conservation Service and the Bureau of Agricultural Economics to make preliminary examinations of watersheds assigned to Committees 2 (Station chairmanship) and 3-b, as listed in the Flood Control Act of 1936, and subsequently amended, to determine from available data and reconnaissance whether a detailed survey is justified by flood damages.

REVIEW OF PAST WORK:

The project was initiated in September, 1937. Balance of year spent in organization, study of the problem, and start on the Lehigh watershed.

ACCOMPLISHMENTS DURING PAST YEAR:

The preliminary examination of the Lehigh watershed (Station chairmanship) also Youghioghony, Kiskiminitas, and Patuxent watersheds, were completed, and reports submitted to Washington. Work was nearly finished on the Passaic (Station chairmanship) and Codorus watersheds. A start has also been made on the Pequest (Station chairmanship) and Alleghony watersheds.

PLANS FOR NEXT YEAR:

Completion of preliminary examinations of the Passaic, Codorus, Pequest and Schuylkill watersheds.

DATE OF COMPLETION:

Passaic watershed, March, 1939; Pequest watershed, April, 1939; Schuylkill watershed, November, 1939. Indeterminate duration, depending on funds.

ASSIGNMENT:

Bevan, Mollenhauer, Mosavage.

RI-AL
Surveys
FCS

PROJECT STATUS SHEET

February 4, 1939

WATERSHED SURVEYS, FLOOD CONTROL

FIELD DIVISION: Flood Control Surveys

WORK PROJECT: Flood control surveys

LINE PROJECT: Watershed surveys, flood control

PURPOSE:

In cooperation with Soil Conservation Service and BAE, to make surveys of watersheds assigned to Committees 2 (Station chairmanship) and 3-b, as listed in Flood Control Act of 1936, subsequently amended, to develop a specific control program for runoff and waterflow retardation, and soil erosion prevention.

ACCOMPLISHMENTS DURING PAST YEAR:

While no surveys have been authorized in Committee 2 area, work was started on Youghioghony River watershed survey, in which we cooperate.

PLANS FOR NEXT YEAR:

Completion of surveys of Youghioghony River and Crooked Creek watersheds.

DATE OF COMPLETION:

Indeterminate, depending on funds. On present funds, not less than 5 years.

ASSIGNMENT:

Bevan, Mollenhauer, MacConnell, Meyer, Augustine.